

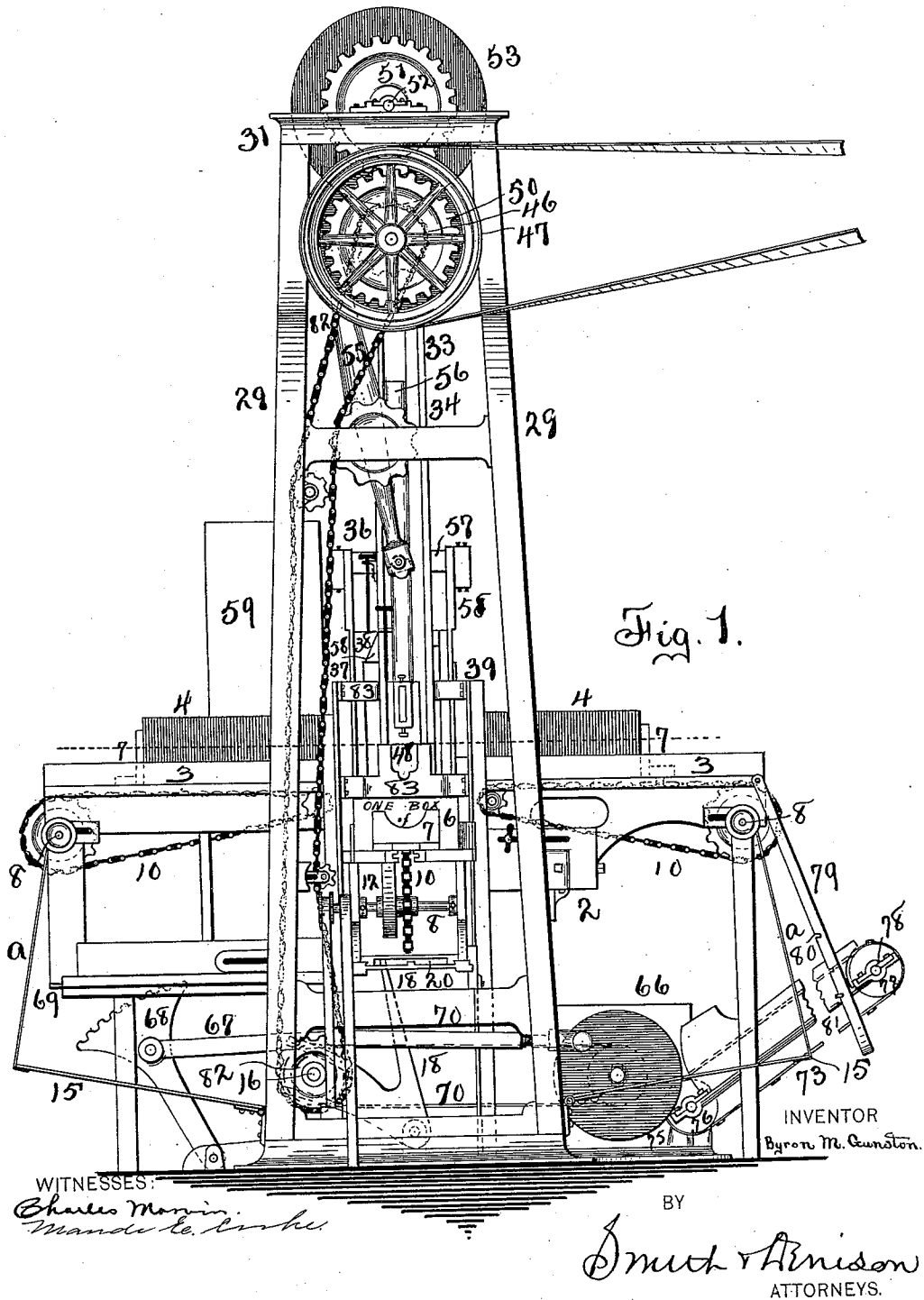
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6 Sheets—Sheet 1.

B. M. GUNSTON.
BOX ASSEMBLING MACHINE.

No. 579,747.

Patented Mar. 30, 1897.



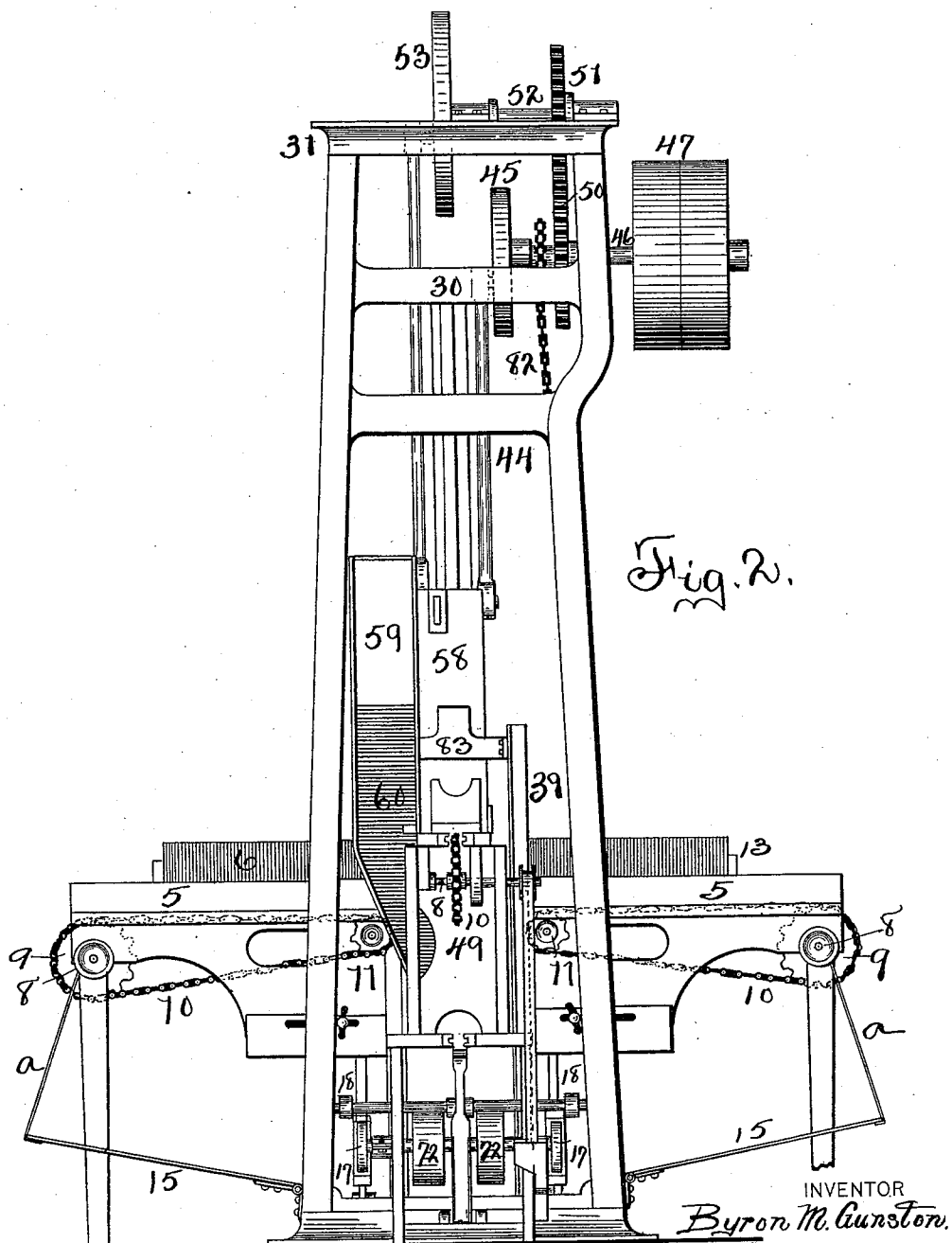
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WITNESSES:

Charles F. Marvin
Maudie C. Cooke

BY

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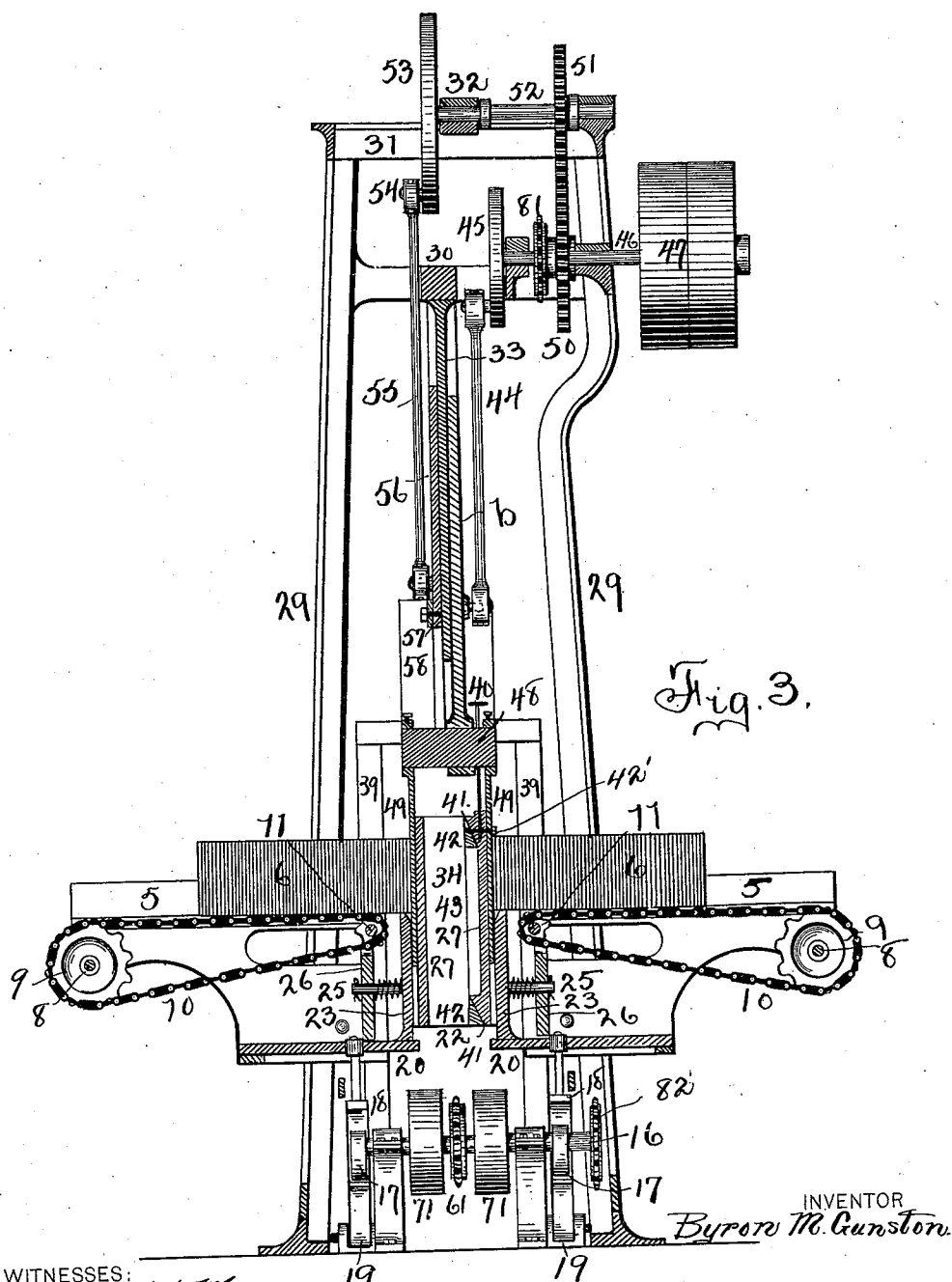
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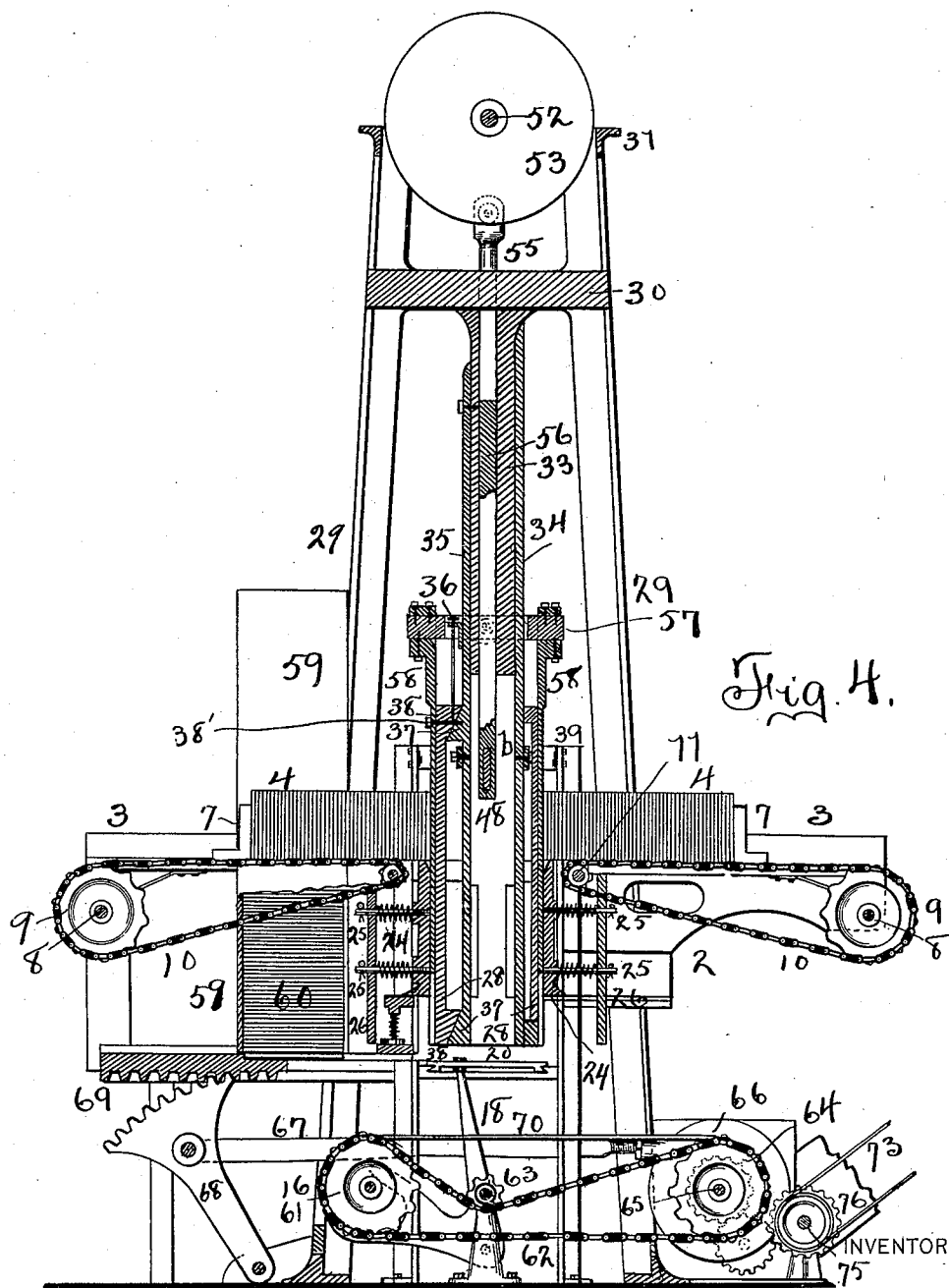
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(No Model.)

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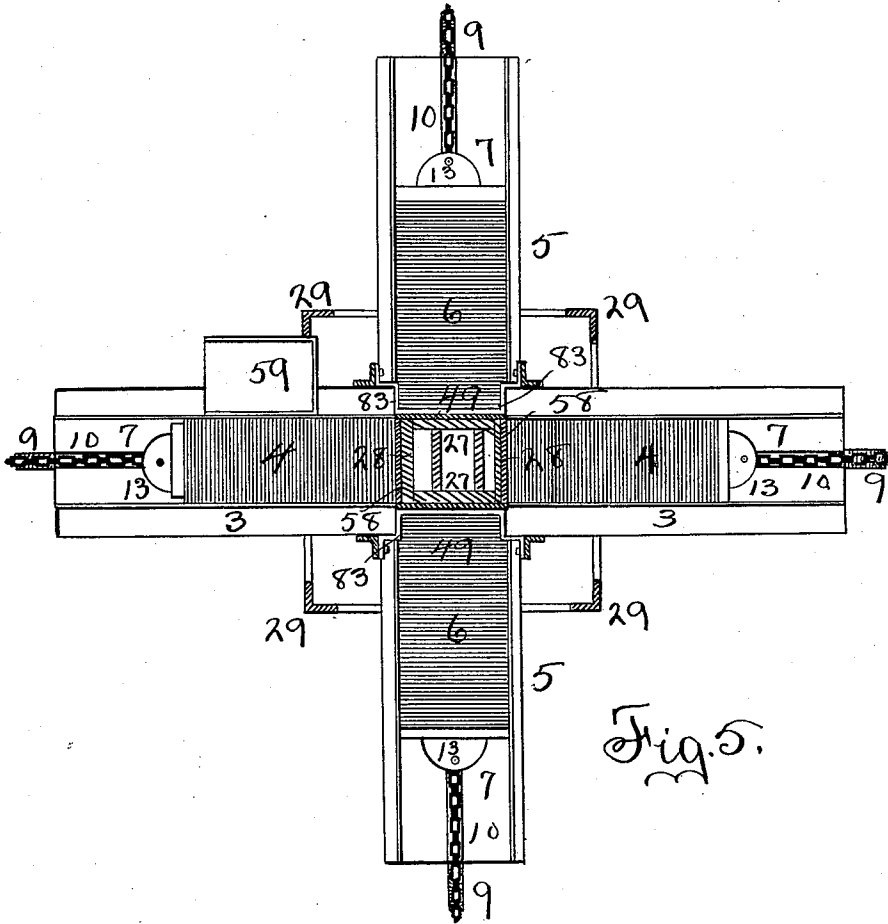


Fig. 5.

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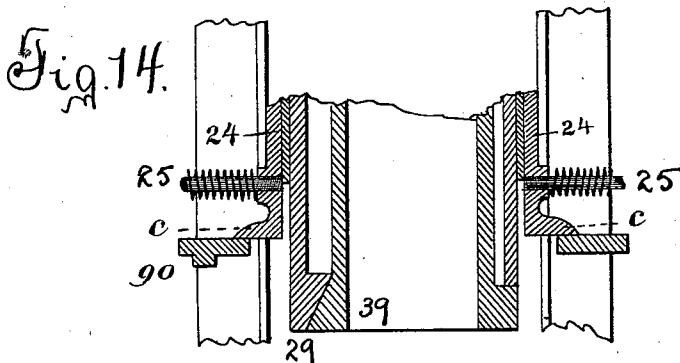
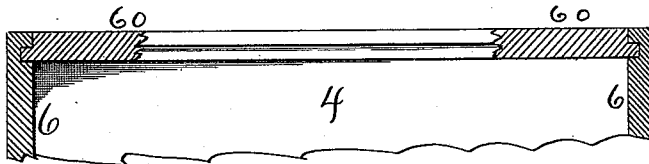
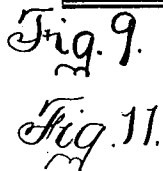
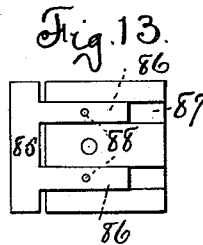
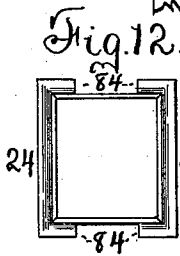
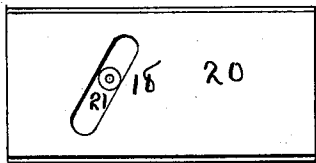
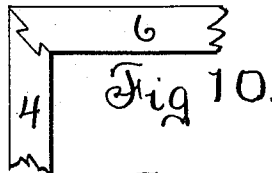
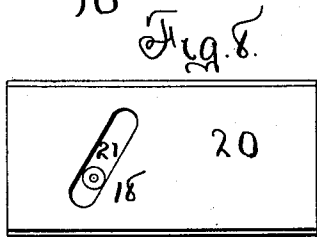
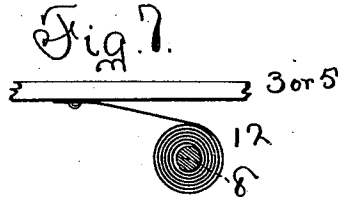
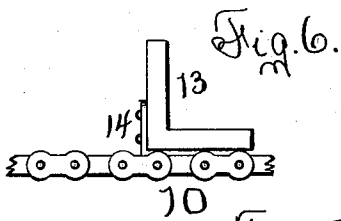
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WITNESSES:

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

BYRON MORTIMER GUNSTON, OF OSWEGO, NEW YORK, ASSIGNOR TO
THOMSON KINGSFORD, OF SAME PLACE.

BOX-ASSEMBLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 579,747, dated March 30, 1897.

Application filed June 4, 1896. Serial No. 594,228. (No model.)

To all whom it may concern:

Be it known that I, BYRON MORTIMER GUNSTON, of Oswego, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Box-Assembling Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to machines for assembling the different component parts of boxes, as when the sides and ends are secured together by means of tongue-and-groove joints and the cover slides into grooves cut in the inner face of each of the sides and one of the ends, the bottom being afterward applied and secured.

The sides, ends, and cover are previously prepared with their tongues and grooves for the corner-joints and with the grooves for the cover, said cover being also fitted to slide freely, but closely, in said grooves for it.

My object is to provide a machine in which two side pieces are simultaneously fed into position. Then two end pieces are simultaneously fed into position above said sides with their tongues and grooves in vertical alignment. Then both ends are forced down until their joints are perfected by the interlocking or securing together of their meeting edges, which creates the rectangle of the box, and then a cover is fed forward and forced into its position in the sides and one end of the box-body, one of said ends being of less width than the other to permit of the entrance of the cover. The box, then complete except as to the bottom, is removed from this assembling-machine by suitable mechanism, as hereinafter described, and the bottom is put on and secured in any ordinary way, as in a nailing-machine; but this part of the assembling is not a part of this invention and no further mention will be made of it.

It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation showing the box ends in the racks on either side and the side plungers about midway of their stroke. Fig. 2 is a side elevation showing the box sides in the horizontal racks on either side and the covers in the vertical hopper and

guide. Fig. 3 is a vertical sectional elevation of Fig. 2, showing the sides with the side plungers partly retracted. Fig. 4 is a like view of Fig. 1, showing the ends and covers, the end plungers partly retracted, and the cover-feed mechanism wholly retracted and ready to feed a cover forward. Fig. 5 is a transverse section on the line of the upper edges of the sides and the ends. Fig. 6 is a detail of a feed-board and its connection to a feed-chain for feeding either sides or ends. Fig. 7 is a sectional detail of the feed-shaft and its actuating-spring wound thereon. Fig. 8 is a top plan of a table for supporting the sides while the ends are being forced down to lock into them. Fig. 9 is a like view of the same retracted to permit the box to drop onto the conveyer. Fig. 10 is a detail of a corner of a box, showing a mitered and tongue-and-groove joint combined. Fig. 11 is a transverse sectional elevation of an end part of the sides and the cover, the latter being partly broken away. Fig. 12 is a top plan of the yielding side walls of the box-chamber with a box-body, sides and ends, therein. Fig. 13 is a detail showing the means for adjusting the width of the chamber by varying the length of the walls. Fig. 14 is an enlarged vertical transverse section of the lower part of the box-chamber on the same line as Fig. 4.

A suitable bed is erected upon a suitable frame or support 2 and is provided with arms or racks 3 for box ends 4 and with like racks 5 for box sides 6, each of said racks being provided with ways 7, by which the sides or ends are guided as they are fed forward horizontally into position for their vertical feed, as hereinafter described.

The primary or horizontal feed mechanism is constructed and operated as follows, being the same in all the places shown:

A suitable feed-shaft 8 is suitably journaled in each rack-arm, upon which a sprocket 9 is secured, carrying a belt 10, which passes around an idler-sprocket 11. A suitable spring 12, Fig. 7, is wound around said shaft, having one end secured thereto and the other to said rack-arm, and 13 is a suitable feed-board provided with a pin or a stud 14, which engages with a link of said belt, Fig. 6, so

that the unwinding tension of said spring will rotate said shaft and drive said chain to carry said feed-board inwardly. When the feed-board is drawn back to put in sides or ends, the chain rotates said shaft to wind up said spring and increase or renew its tension. To retract said feed-board, a mechanism can be used comprising a cord or chain *a*, suitably connected to it and further connected to a foot-treadle or lever 15, so that when the latter is forced down the feed-board will be drawn back to permit the filling in of the sides or ends, and when released the spring will throw said feed-board against said sides or ends to hold them and feed them.

Box-supporting mechanism.—A shaft 16 is suitably journaled in said table-supports, upon which cams 17 are secured in engagement with oscillating levers 18, pivoted at 19. The upper end of each of said levers engages with sliding work-table 20, as by a slot 21 therein, said tables being mounted and free to be reciprocated in suitable ways, and when projecting inwardly constitute the movable bottom of the box-chamber 22, upon which the box sides are normally supported while the ends are being forced down. This slot receives the free end of a lever and is at about the angle of forty-five degrees, because the direction of the movement of the table is at a right angle to the swing of the lever, the upper end of which operates as a wedge to shift the table. The upper inner edges of the side walls 23 and end walls 24 are beveled substantially as shown, the walls 23 resting upon the table 20. The walls 24 are provided with outwardly-projecting lugs *c*, which bear upon transverse bars 90 to support said walls. Rods and springs 25, mounted in suitable supports 26, pendent from the feed-racks, are connected to said walls and permit them to yield outwardly when the box ends are forced in and to grip them when inserted. Suitable means are provided to regulate the inward movements of these walls. Within said outer walls and parallel to and separated adjustably from them are guides or inner walls 27, for the sides, and 28, for ends, creating an annular chamber between said inner and outer walls into which the box side and end blanks are fed. One inner side wall 27 is adjustable laterally, as is also one inner end wall 28. A frame is erected comprising uprights 29, cross-bars 30, and cross-beams 31, connecting the upper ends of said uprights, and a cross-bar 32 upon said beams. From the cross-bar 30, Fig. 4, a guide-bar 33 is suspended in any suitable manner or by any suitable means of connection, and upon this the bars 34 35 are secured, one of the inner walls 28 being secured to the bar 34, Fig. 4, while the other is connected to the bar 35 by means of the screw-bolt 36 and provided with beveled shoulders 37, engaging with like shoulders 38 upon said bar and which are secured together by a bolt 38', whereby by loosening said bolt and then operating said

screw-bolt the width of said chamber is varied to receive ends of varying lengths. To the bar 35, Fig. 3, one of the side walls 27 is connected by a screw-bolt 40 and pivoted with beveled shoulders 41, in engagement with like shoulders 42 upon a bar or bars 43, connected to the opposite side wall, and 42' is a bolt through said shoulders to secure the side walls in position when adjusted. Suitable vertical slots (not shown) are provided through which the bolts 38' and 48' are inserted, so as to permit said vertical adjustments when the respective bolts are loosened.

Side and end assembling mechanism.—In a suitable way in one side of said guide-bar 33 a slide *b* is mounted and reciprocated by a pitman-rod 44, actuated by a crank-pin connected to a disk 45 upon a shaft 46, driven by a power applied to a pulley 47 upon said shaft. A cross-head 48 is connected to said slide, and plungers 49 are carried by said cross-head and reciprocated vertically by the revolution of said crank-disk. When raised to the height of the stroke, the feed mechanisms feed the box sides inwardly, bringing one into position under each plunger, and then by the downward stroke two box sides are forced down into the chamber 22 and onto the tables 20, said sides being laterally supported by the walls. A gear 50 on the shaft 46 drives the gear 51 on the shaft 52, which drives the disk 53, provided with a crank-pin 54, to which a pitman 55 is connected, its lower end being connected to a slide 56, mounted in a way on said guide-bar 33, said slide being connected to a cross-head 57, to which plungers 58 are secured. When said crank-disk reaches the limit of its upward stroke, the feed mechanisms feed two of the box ends in under the plungers. To permit the insertion of the cover, one end piece is narrower than the other, substantially the thickness of said cover, so that when said plungers descend together the end pieces are pushed down by them until the plungers reach the downward limit of their stroke and the end pieces are in position. As these end pieces are fed into place their tongues (or grooves) are in direct vertical alinement with the grooves (or tongues) of the sides. Then when the ends are forced down said tongues and grooves engage with each other, the tongues sliding in the grooves, until when the downward limit of the stroke is reached said sides and ends are locked together, the rear end piece resting upon the table 20 and the front end piece being above said table a distance equal to the difference in the vertical width of said ends, thus leaving a slot way or space through which the cover can be inserted.

Cover mechanism.—A vertical hopper 59 holds the covers 60, its lower end being adjacent to the front end of the box-chamber 22. A sprocket 61 on the shaft 16 through the belt 62, with or without the idler 63, drives the sprocket 64 on the shaft 65 to rotate the

crank-disk 66 and actuate the pitman-rod 67 to oscillate the geared segment 68 to reciprocate the feed-slide 69, mounted in suitable ways. When retracted, Fig. 4, said feed-slide engages with the lowest cover, and then the forward movement pushes the cover inwardly and into the grooves in the sides, and, finally, into the groove in the rear end at the final limit of the stroke.

10 *Box discharger and conveyer.*—As the feed-slide starts to retract, the sliding tables 20 are retracted and the side-feeding plungers again descend, the sides, then entering, force the box out from the grips of the walls down onto an endless belt 70, carried by pulleys, drums 71, on the shaft 16, and 72, on the shaft 65, which deposits the boxes on an endless belt 73, driven by the train of gearing 74, which drives the shaft 75 and drums 76 thereon and also the drum 77 on the shaft 78. This conveyer is adjustable as to the height of its outer end by means of bars 79, provided with notches 80, which engage with pins 81 on the sides and can be of any length desired to convey the boxes to any point desired.

25 The term "box" is herein applied to the actually incomplete box, which still lacks the bottom, which is applied by another machine, as before stated, and which is not a part of the invention.

30 A sprocket 81 on the shaft 46, belt 82, and sprocket 82' transmit power to and rotate the shaft 16.

The word "interlocked" or "interlocking" is not used in a restricted sense, but as covering not only actual interlocking but also the feeding of the sides and ends into position to be secured together without the actual interlocking.

40 The frame 39 and its cross-bars 83 cooperate to guide the feed-plungers in their vertical movements, to stiffen and steady the adjacent working parts, and to prevent the sides or ends being pulled up by the raising of the plungers, with which said sides and ends are in spring-pressed frictional contact.

45 In Figs. 12 and 13 the yielding outer side walls of the box-chamber are detailed, each side wall having inwardly-projecting flanges 84, which are beveled the same as the sides, said beveled flanges operating to guide the box sides into position and then to guide the box ends for interlocking. These side walls are adjustable as to length by means of a section 85, provided with arms 86, which are mounted in suitable ways 87, and when adjusted are secured by suitable set screws or bolts 88.

50 It will be seen that each feed-spring for either sides or ends varies in tension, its tension increasing according to the distance the feed-board is drawn out and consequently varies according to the load or number of side or end pieces which may be in each rack, 65 having at all times a tension proportional to their number.

I am aware that weights have been con-

nected to feed-boards, exerting a constant force to feed the sides or ends, but that is not my invention.

70 What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a box-assembling machine the combination with the feed-racks for sides and ends converging at the four sides of a rectangular chamber to receive the sides and ends preparatory to their being connected or secured together, yielding outer walls surrounding said chamber, and means to first feed the sides and then the ends down into said chamber. 80

2. In a box-assembling machine the combination with racks to hold and feed the sides and ends, of a chamber below the plane of said racks, a pair of side-feeding plungers, and a pair of end-feeding plungers operating sequentially to said side-feeding plungers. 85

3. In a box-assembling machine the combination with racks to hold and feed the sides and ends previously prepared to interlock at their meeting edges, of vertical walls, creating an annular chamber between them provided with a false bottom, normally supporting the box sides in said chamber in position to interlock with the meeting edges of the box ends when they are forced down. 95

4. In a box-assembling machine the combination with racks to hold and feed the sides and ends previously prepared to interlock at their meeting edges, of yielding or adjustable parallel walls, creating a chamber between them and a bottom normally supporting the box sides while the ends are being forced down to interlock their meeting edges, and means thereafter to retract said bottom, and permit the interlocked sides and ends to be forced down from said chamber. 100

5. In a box-assembling machine the combination with parallel yielding or adjustable walls creating an annular chamber into which the previously-prepared box sides and ends are successively fed, to interlock their meeting edges, of a bottom, normally supporting the box sides while the ends are being interlocked with them, to create a box-body, and means to retract said bottom to permit said body to be forced down from said chamber. 110

6. In a box-assembling machine parallel yielding or adjustable walls, creating an annular chamber into which the previously-prepared box sides and ends are successively fed to interlock their meeting edges, of a bottom normally supporting the sides while the ends are being interlocked with them, and means to force a cover, into the box-body thus created. 115

7. In a box-assembling machine, parallel yielding or adjustable walls, creating an annular chamber into which the previously-prepared box sides and ends are successively fed to interlock their meeting edges, of a bottom normally supporting the sides while the ends are being interlocked with them, and means to force a cover into the box-body thus created, and to thereafter retract said bottom, 125

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to permit the box to be forced down from said chamber.

8. In a box-assembling machine, the combination of a frame, racks thereon to hold the
5 box sides and ends, spring-actuated feed-boards in said racks engaging with such sides or ends, and vertically-reciprocating plungers engaging with pairs of sides and ends to feed
10 them sequentially into an assembling-chamber, of parallel vertical walls creating a

chamber into which said sides are first fed and by which they are held in position to interlock with the edges of the descending ends.

In witness whereof I have hereunto set my hand this 28th day of May, 1896.

BYRON MORTIMER GUNSTON.

In presence of—

WM. V. BURR,

H. L. HOWE.